

Systems Engineering: The Glue that Binds Disparate Acquisition Organizations

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1 May 2008

SSTC 2008

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Topics

- The Situation
- The Ways Forward
- The Benefits



The Situation

Acquisition Directorate

Mission Systems

- Software Applications
 - Mission
 - Corporate
- Hardware platforms
- Infrastructure
 - Networks
 - Servers
- Some Operations and Sustainment

Enterprise Operations Directorate

Infrastructure

- Networks
- Network Operations
- Servers
- Information Services

Software Applications

- Network Appliances
- Common Applications

Operations and Sustainment



The Situation

- Inefficient and ineffective application of resources in an Information Technology development environment
 - Duplicative work and expenditures
 - Inefficient Capacity Management
 - Overlaps, gaps, disconnects

Lack of Enterprise Solutions



The Situation

- The Problem:
 - Lack of a complete enterprise* view
 - Capabilities and work allocation
 - Requirements definition
- The Solution
 - Establish better business model
 - Establish an approach to take an enterprise view to all changes

* 'Enterprise' is the National System for Geospatial-Intelligence (NSG)



Way Forward #1- Change Business Model

Application Service Provider-
Infrastructure Service
Provider (ASP-ISP)



ASP-ISP Business Model

- Segregates work between service providers
- Drives efficiencies into parent organizations
 - Minimize duplication of functions
 - Efficient application of resources
- The right model to apply
 - Continual technology changes
 - Growth in customer demands
 - Static budgets



ASP-ISP System Elements

ASP

Corporate Apps

Finance
Personnel
Mission Assurance (e.g., Personnel, FISMA apps and tools)
Training
Contract Mgmt
Requirements Mgmt
Program, Project & Performance Mgmt
Database Mgmt Systems

Mission Apps

Geospatial Knowledge Base
Knowledge Production & Exploitation
Resource Tasking & Marketplace

Web Based Secure Environment – Development Interfaces
PO (Portal, SOA, Web server) Interfaces, integration with mission apps
Multilevel Security (MLS) Guard and transfers
Identify Management enablement

Hardware*

Workstations
Servers
Communications components
Storage components
Phones, PDAs, Video, Blackberry, etc.
Firmware

*Includes NGA and NSG hardware

ISP

Enterprise Management Services

Enterprise Service Center
Tier 1 O&S
Enterprise Information Assurance IAVA, anti-virus, IDS, Firewalls, Computer Network Defense
Enterprise Information Management Enterprise Management Tools, Interface development/ integration, monitoring and metrics

Common Services

Customer Support tools
Office Automation

Storage Services

Disks, CD, Tapes, etc.
Remote storage
Mgt and monitoring tools
Processing and Storage

Application Hosting Services

Server Hardware & Operating System
E-Mail, Web, Print, Software Management System
Licensing
Tier 2&3 for HW & Operating System
Directory Services
Domain Name Service
Timing
Authentication/Authorization

Transport Services

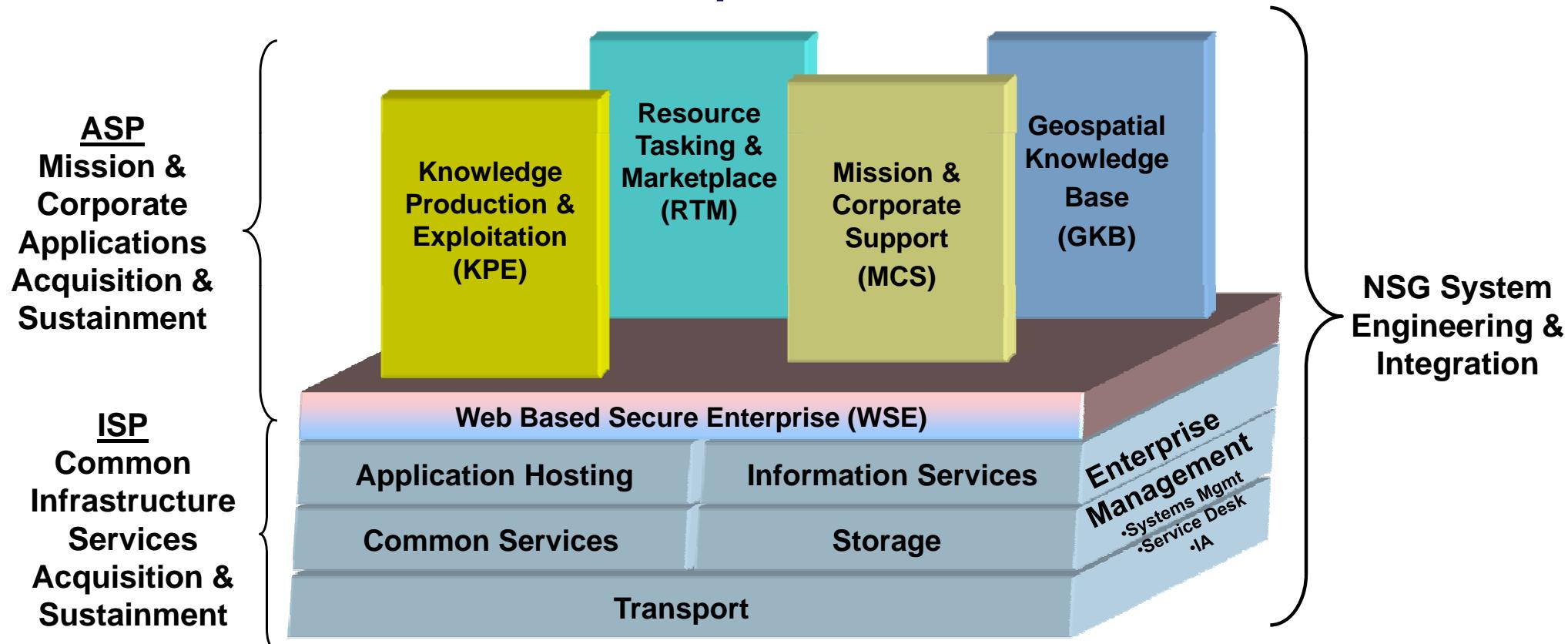
HW – Routers, Hubs, Switches Circuits

Support Tiers:
Tier 1- Help Desk
Tier 2- On-site technician
Tier 3- Factory



ASP/ISP Model at NGA – Portfolio View

Achieves economies of scale, reduced costs, an agile development environment, and a reliable, responsive IT infrastructure



Economies of Scale Through: *Consolidated, Virtual Computing
Shared, Virtual Storage
Enterprise Support Services*

Maximizes available resources



ASP-ISP Responsibilities

ASP

“Cradle-to-Grave” responsibility for
Corporate/Mission Apps

- ASP Element Engineering
 - Planning
 - Requirements
 - Application Architecture
 - Application Design
- Software acquisition
- Software programming
- Software integration testing
- Software maintenance
- Tier 2 & 3 support for mission and corporate applications
- ASP application license management

Support Tiers:
Tier 1- Help Desk
Tier 2- On-site technician
Tier 3- Factory

ISP

“Cradle-to-Grave” responsibility for
IT infrastructure/Common Apps

- ISP Element Engineering
 - Planning
 - Requirements
 - Infrastructure Architecture
 - Infrastructure Design
- Security infrastructure
- IT hardware and supporting software acquisition
- O&S of hardware/designated software
- Systems administration for common applications/operating systems
- Tier 2 & 3 support for IT infrastructure, common applications
- License management servers
- ISP infrastructure software license mgmt

ASP - ISP

- Requirements Analysis & System (Physical) Architecture (NSG Allocated reqts baseline)
- Project Planning
- System Monitoring/Modeling
- Studies
- Request for Change Costing Guidance
- Joint engineering and management reviews
- IT Infrastructure upgrade timing consistent with ASP Needs
- H/W – S/W Integration IC&T
- S/W Deployment
- Program Planning and programming
- System Sustainment (Tier 2)
- Verification & Validation
- Acquisition Planning
- Contract Strategy
- External Interfaces (ODNI, CIO, USD(I))
- Functional Management Interfaces
- NSG PM & DPM Interface

NSET Responsibility

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Value Proposition

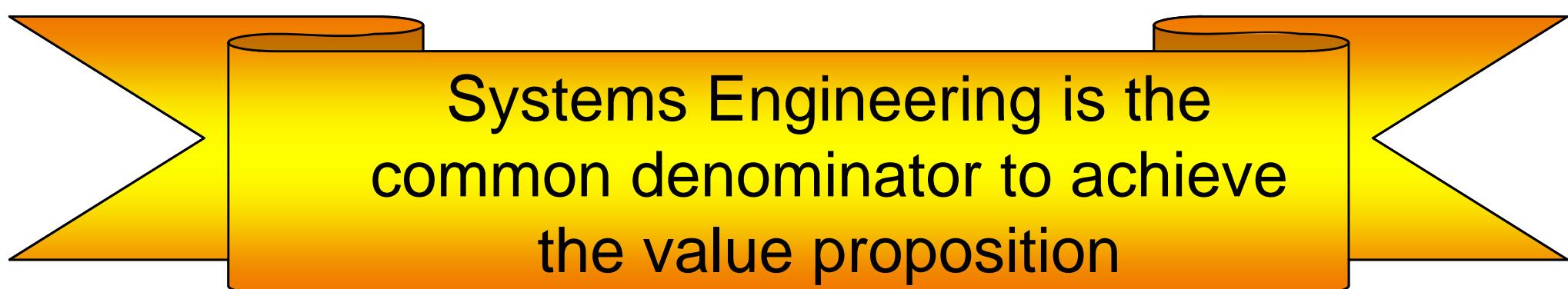
- Eliminate stovepipe systems and infrastructure
- Maximize use of all organizations' available resources
- Achieve economies of scale
 - Consolidated virtualized services
 - Truly common architecture





The Blinding Obvious

- Both providers perform SE
- Both providers must ensure their elements interface and interoperate
- Both providers need to reduce the complexity and cost of their elements



A yellow ribbon banner with black outlines and a slight gradient from white to yellow. It features two large white chevron shapes pointing towards each other at the ends. The text is centered on the banner.

Systems Engineering is the common denominator to achieve the value proposition



Way Forward #2- Enterprise Systems Engineering

(aka System of Systems Engineering)

- Central SE team to bind ASP & ISP activities
 - Perform lifecycle Enterprise-level SE for the NSG Program Manager
 - Synchronize technical and management activities
 - Assure systems and infrastructure integrate and interoperate

NSG Systems Engineering Team
(NSET)



NSET

- Key enabler to achieve value proposition
- Integrated team of ASP & ISP systems engineers
- Concurrent Engineering
 - Application developers
 - Infrastructure engineers
 - Operations and Sustainment planners
 - Specialty engineers





NSET

- Evaluate, sponsor and monitor concept studies
- Evaluate strategic and technical requirements
 - Architecture impacts and direction
 - Technical feasibility
 - Impacts to existing infrastructure
 - Alternative design approaches
 - Rough-order-magnitude cost, schedule and risks



Think Enterprise

A yellow ribbon banner with the words "Think Enterprise" written on it. The banner has black outlines and is flanked by two yellow triangular flags.



NSET Composition

- Co-lead by ASP & ISP senior SEs
- Matrixed ASP & ISP engineers
- Reachback support to home SE offices
- Physical co-location is essential



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NSET Core Skill Sets

- NSET Management
- Enterprise requirements management
- Systems' architecture development
- Enterprise modeling and analysis
- Interface control
- SE monitoring of implementation activities

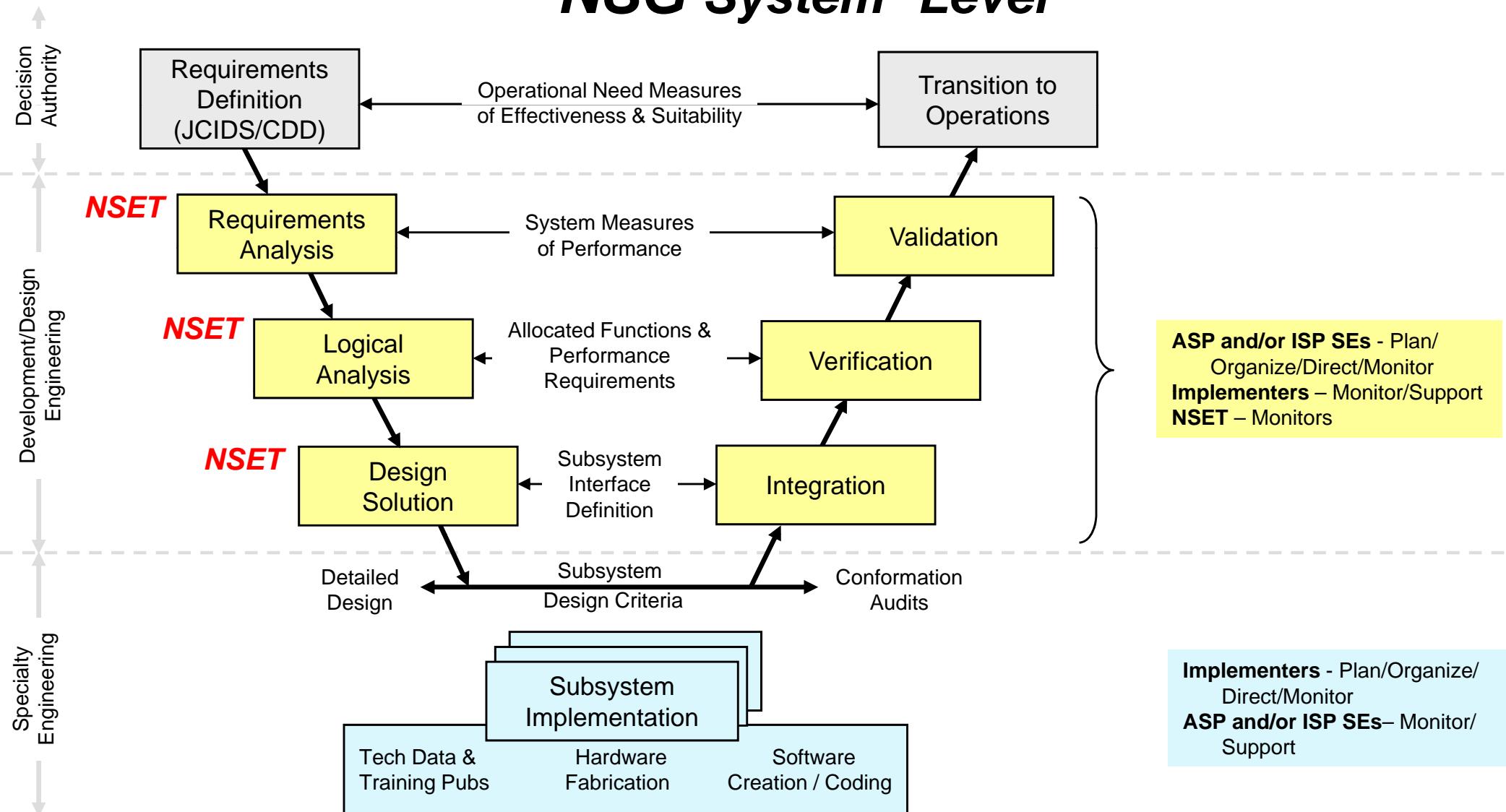


NSET

- Applies most applicable best SE practices
 - Eisner Systems Engineering Model
 - DoD Systems of Systems Engineering Guide
 - DoD Desktop Acquisition Guide
 - INCOSE SE Handbook
 - FAA Integrated Capability Maturity Model
- Ensures key processes are used by service providers
 - Requirements Management
 - Configuration Management
 - Risk Management
 - Readiness
 - Test and Evaluation



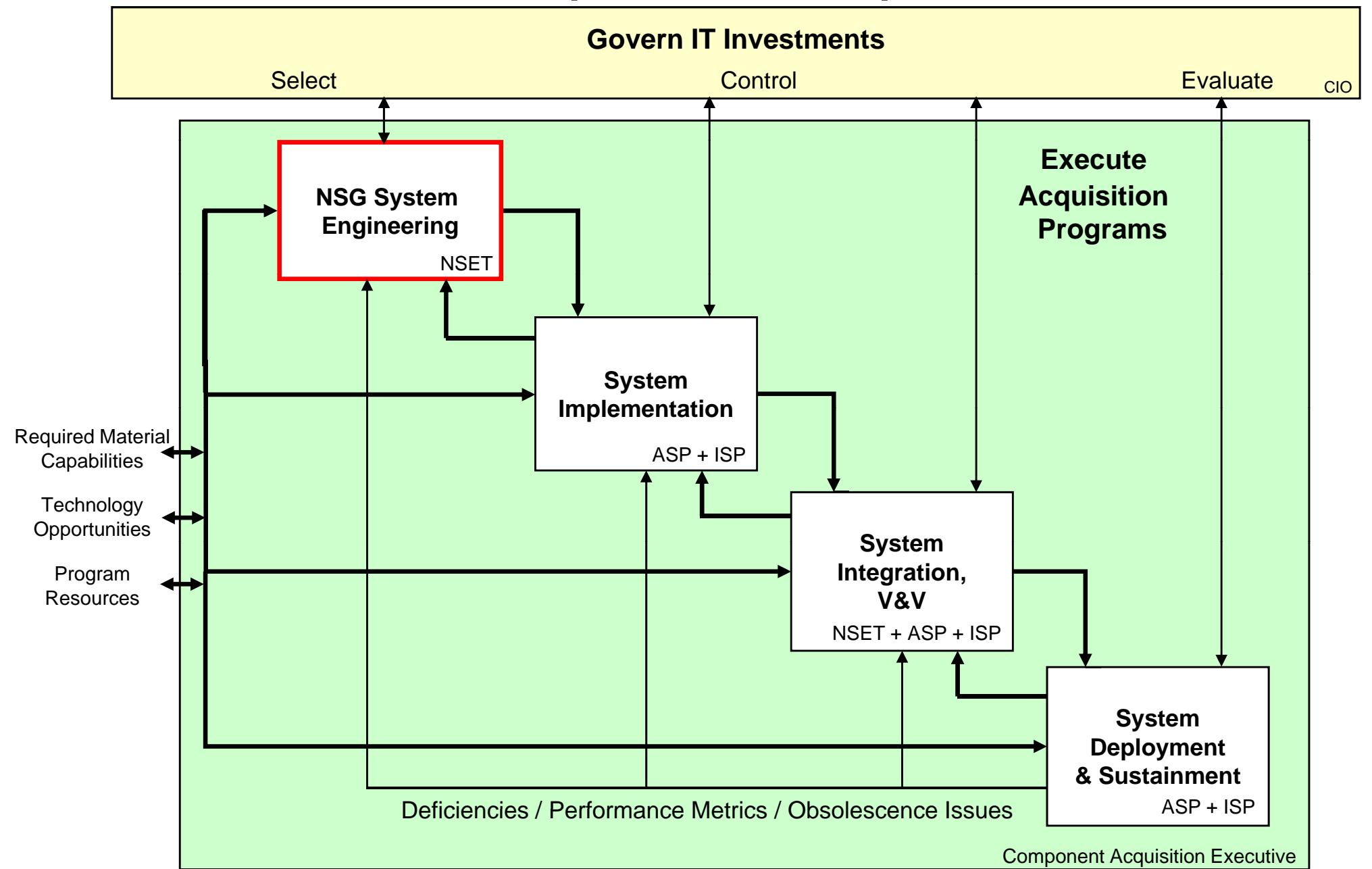
Systems Engineering “V” model NSG System* Level



* In the context of this chart, the “system” is the NSG, and “subsystems” are NSG segments or products.

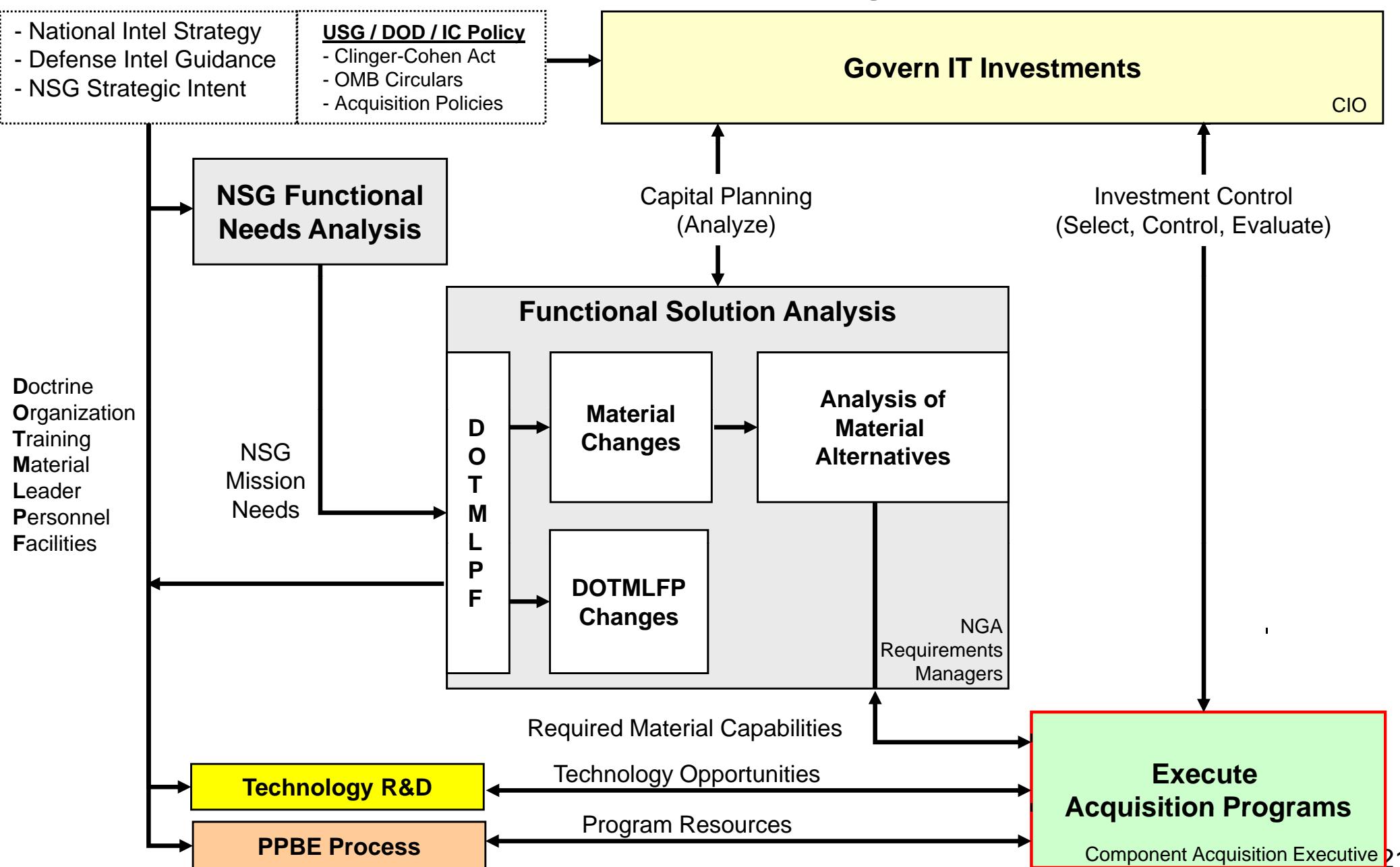


Relationships with Acquisition Processes





Relationships Among NGA Processes





Managing Culture Change

- ASP-ISP and NSET are major changes
- Changing the culture is HARD
- NSET SEs form a cohesive support network
- NSET SEs spread the word
- Leadership actively advocates the changes
 - Multi-faceted communication
 - Directing work into the NSET
 - Directing the use of NSET practices and forums



NSET Member Motivation

- Unambiguous senior leadership support
- Knowledge that Enterprise SE is the best approach
- Personal lessons observed and learned
- Personal successes



NSET Piloting

- First step of a phased implementation
- Representative sample of actual initiatives
 - Rapid delivery of capability required
 - Application development only
 - Multi-year / multi-phased
 - Pre-concept & Concept Phase studies



NSET Piloting Results

- Contributed to better defining roles and responsibilities
 - Charter
 - Concept of Operations
 - New and revised forums and agendas
- Numerous lessons observed and learned
- Broadened opportunities and practices



Formal Stand-up

- Slow, low-key, phased
 - Team organization
 - Getting office space
- ... but operations have begun
 - Numerous studies reviewed and approved
 - Increased involvement in enterprise activities
 - Critical momentum building
 - Continuous improvements

“...this is something the NSET
should handle....”
(the new mantra)



NSET Benefits

- Currently qualitative findings only
- Improved technical management of enterprise
- ASP & ISP functions and enterprise initiatives becoming better understood and executed
- Reducing delivery time and pain



NSET Benefits

- Infrastructure capabilities aligned with system needs
- Finding/eliminating duplicated implementation and support costs sooner
- Reduced mis-communications and disconnects
- Enterprise changes begin with joint analyses
 - Better insights to other providers' capabilities
 - Earlier approval of funding recommendations.



Conclusions

- ASP-ISP business model can improve efficiency of work allocation on Information Technology developments
- Systems Engineering is the common denominator to synchronize collaboration
- Increased responsiveness to the customer needs and quality of service will continue



Questions???



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